STUDIES IN ISLAM

*SERIES*

# ON COSMIC VERSES IN THE QURAN

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# ABOUT THIS BOOK

*The present contribution to the series "Studies in Islam" is particularly welcome at a time when man is trying to reach the moon for the first time in the history of the human race. The author Dr. Jamal El Fandy is a well known scientist whose reputation in the field of astronomy is recognized here and abroad. He has drawn on his vast resources of knowledge and experience in writing this booklet in which he managed to reconcile both science and religion.*

*While maintaining that the Holy Qurân cannot be taken as a scientific textbook, he has yet emphasized its truthfulness in a lucid style which is acceptable to layman and scientist alike.*

*At a time when new scientific achievements are rapidly changing our traditional outlook, the appearance of such a book by an eminent scientist is particularly welcome, and will, I am sure, be read with interest and enthusiasm.*

Dr. SHAWKI SUKKARY.

# PREFACE

*IN THE NAME OF ALLAH, THE BENEFICENT, THE MERCIFUL!*

While embarking upon the task of writing about the verses relating to the universe in the Holy Qurân, I do not claim that the Holy Writ is a text-book for any branch of science in the technical sense of the word. Yet, I do not deny that it discusses here and there a variety of subjects which are definitely scientific in their nature. Undoubtedly, these verses bear testimony to the truthfulness of the Qurân. This is becoming even clearer and more conspicuous in view of the advances made by different scholars in the realm of science. Nations are today judged by their advances and achievements in matters of culture and learning. And this again is embodied in the Holy Qurân. Actually, its inimitable elocution is not limited to a particular period and has at the same time no known boundaries. No other book, except the Holy Qurân, can be so eternal and so all-embracing at the same time. No other verses can be so securely preserved in the hearts and its meaning so well-understood as the Qurânic verses. "Nay, it is clear messages in the hearts of those who are granted knowledge." (Sûrat Al-Ankabut : The Spider).

While I intend writing on the subject I do not claim that I can cover the whole field. I confess that I may have overlooked many aspects of the subject, because it is so wide, so deep, that an individual cannot cover

it in one book. It is clear enough that when the caravan of civilisation will proceed further and humanity will gain deeper and deeper insight, more horizons will appear and the Holy Qurân's inimitable elocution shall become more visible.

There are certain people who disfavour such studies. They are led by those who have no faith in science or those who disbelieve in the harmony of religion and science. That disbelief originates from the fact that scientific theories keep on developing and changing while religion is stable and cannot be altered. The Middle Ages have witnessed a period of severe strife waged by the advocates of religion and the advocates of science. The same problems continue to trouble the minds of many of us. But Islam has nothing to do with this type of struggle since it has already encouraged gaining insight in the search of the universe and the continuation of efforts to uncover hidden facts regarding the same : "See they not what is before them and what is behind them of the heaven and the earth ?" (Sûrat Saba). "...And reflect on the creation of the heavens and the earth : Our Lord, Thou hast not created this in vain. Glory be to Thee." (Sûrat Al-Imran : The Family of Imran).(1)

Since those days, knowledge and sciences began their advances to reach perfection and to gradually prove their uniformity with religion.

*JAMAL EL FANDY.*

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(1) All translations of the verses of the Holy Qurân quoted in this book are taken from Maulana Muhammad Ali's English translation of the Holy Book—Translator.

# THE QURAN AND SCIENCE

The word "science" here stands for all branches of knowledge without particularising any of them. It includes studies connected with the universe and its allied subjects under which fall the modern sciences such as biology, chemistry, physics, astronomy and geology. The Holy Qurân, undoubtedly, raises the prestige of these sciences and encourages people to study them for the general good.

The most sublime reference in this respect and the most important fact in this connection is that the very first verses of the Holy Qurân gave incentive to gain knowledge and to glorify it. The beginning of the Revelation was actually a signal for the dawn of knowledge and a forerunner of giving it its due dignity. The very first verse of the Holy Book reads : "Read in the name of thy Lord Who created, created man from a clot, Read and thy Lord is most Generous, Who taught by the pen, taught man what he knew not." (Sûrat Al-Alaq: The Clot).

The Holy Qurân explains later at different stages of the Revelation the meaning of science and education. which includes, on a large scale, all sciences connected with the universe, matter, energy, systems and life. These are the sciences by which Man gains in power and strength and faith and fear of God which is the chief objective of life. Refer for example to the following verses :

"Those of His servants only who are possessed of knowledge fear Allah. Surely, Allah is Mighty, Forgiving." (Sûrat Fatir : The Originator).

"Surely in the heavens and the earth are signs for believers." (Sûrat Al-Jathiya : The Kneeling).

"And in the earth are signs for those who are sure." (Sûrat Al-Zariyat : The Scatterers).

"And He it is Who has made the stars for you that you might follow the right way thereby in the darkness of the land and the sea. Indeed We have made plain the signs for a people who know." (Sûrat Al-Anaam : The Cattle).

"And of His signs is the creation of the heavens and the earth and the diversity of your tongues and colours. Surely there are signs in this for the learned." (Sûrat Al-Rum : The Romans).

"Seest thou not that Allah sends down water from the clouds, then We bring forth therewith fruits of various hues ? And in the mountains are streaks, white and red, of various hues and (others) intensely black. And of men and beasts and cattle there are various colours likewise." (Sûrat Fatir : The Originator).

"Say : Are those who know and those who know not alike ?" (Sûrat Al-Zumar : The Companies).

This is apart from a number of other verses which not only speak highly of sciences and scientists, but draw our attention and direct us to pursue knowledge and discover the secrets of the universe on the line of the present divisions of modern sciences as we have already explained.

# THE QURAN DIFFERENTIATES BETWEEN CONVICTION AND SPECULATION

The formations of modern science have been founded on the difference between conviction and speculation. Recognition of this difference is the pillar on which rests the structure of all sound and solid cultures. While the Holy Qurân addresses sound minds, scientists also do not recognise any of the branches of knowledge except those which have the support of reason and sound argument or potent experience.

It is deeply regretted that despite the fact that the Holy Qurân has made vigorous appeal for this lofty ideal as regards sciences, which was actually the basis of the success achieved by the modern scientific renaissance and differentiated between conviction and speculation, Muslims, during a certain period of time, wasted time and effort in useless talk, adoption of an aimless philosophy and making studies in baseless metaphysics which encouraged the spread of myths, fancies and imageries. At that time, baseless talks and arguments, trying to explain the familiar natural phenomena, took place. They, for instance, interpreted ebb and tide as an act of a sea angel who was supposed to put his thumb in the water to make it bubble and expand and to take it off to make it recede, causing ebb. The Holy Qurân says : "Say : Have you any knowledge so you would bring it forth to us ? You only follow a conjecture and you only tell lies." (Sûrat Al-Anaam :

The Cattle). "And most of them follow naught but conjecture will not avail aught against the Truth." (Sûrat Yunus : Jonah).

It is a fact that the scientific renaissance in the West was due to correct observations and sound experiments. Scientific laws are nothing but interpretations of phenomena in the material world. Although we do not claim absolute authenticity of such laws, yet we agree that they represent the largest possible amount of authenticity and precision. These laws are gradually moving towards perfection with the advancement of sciences. With the passage of time and expansion in the horizon of knowledge, and in view of growing accuracy in observation, scientists introduce, from time to time, amendments or modifications in some of the scientific laws so as to bring them closer to fact or to make them more useful.

This means that scientists are continuously carrying on research work about the universe. They are making us in this endeavour of a variety of matters for research, the foremost of which deal with theory. Next to this are experiments in the laboratory, farms or in nature as a whole. This is exactly what the Holy Qurân ordains in matters of understanding realities, as it says :

"Say : Travel in the earth then see how He makes the first creation." (Sûrat Al-Ankabut : The Spider).

"See they not the clouds, how they are created ? And the heaven, how it is raised high ?" (Sûrat Al-Ghashiyah : The Overwhelming Event).

Do they not consider the kingdom of the heavens and the earth and what things Allah has created ?" (Sûrat Al-Aaraf : The Elevated Places).

There are several other verses with similar meanings. This shows that it is not wise for the people to have mere fantasy as the basis of their religious ideologies or scientific theories. A conclusion which has no support of experience or proof will not do. In so doing, they will be like those who deduce the characteristics of matter or the phenomena of the universe without studying the objects they are observing, or like those who inherit their beliefs without putting them to test to find out right from wrong. The Holy Qurân, describing such people, says : "And when it is said to them, Come to that which Allah has revealed and to the Messenger, they say : Sufficient for us is that wherein we found our fathers. What. Even though their fathers know nothing and had no guidance." (Sûrat Al-Maida : The Food).

# SOME PRINCIPLES RELATING TO THE UNIVERSE

Study of the characteristics of matter and the utilisation of different energies in the universe have been the main sources of human success. Although we make use of electricity for warming up, medical treatment, lighting, automation, driving locomotives and cars, etc., yet our knowledge of the nature of electricity is incomplete. Similar is the case with light and heat. To all of them, we give a vague name, energy, which is hidden in the universe and which can change into one another, but nobody can create it from nothingness.

Normally, all scientific theories attempt to interpret the origin of the universe on the basis of certain assumptions which could not be proved, or on the basis of certain points beyond which nobody could go. The science of physics does not touch the subject of creation from a state of nothingness. It only concentrates on a study of the characteristics of the existing, whether it is matter, energies or life. We shall discuss this point later.

But before we proceed to discuss the greater world represented in existence as a whole, it is better to talk first about the smaller world as represented in the smallest elementary particles which go to make the material, which is the atom. Atoms are made of the smallest possible non-matter particles. One could only define the nature of each matter or element by the number of particles existing in each atom. The most

simple of all atoms in construction is the hydrogen atom. It is known as the universal gas or the gas which brought the existence into being, from which all other known matters have developed. The hydrogen atom is composed of a nucleus, which is a proton of positive nature, around which revolves an electron, which is negative.(1) The construction of atoms gets more and more complicated as we proceed to know other material elements.

It was generally believed until recently, that atoms could not be further divided into elementary particles. The methods used for splitting them were useless. But, once the methods for splitting the atom were discovered in this age, it became certain finally that huge energy was inherent in it. The basis of the energy was the same which was used originally in uniting its elementary particles, particularly the constituents of the nucleus which came into being for the first time in the stars under tremendous pressure and heat, the degree of which is beyond description and imagination.

In most elements, the nucleus is not restricted to the positive proton. Instead, there are neutrons, which are elementary particles, having no distinguishing charge. It is understood that the nucleus is the first thing which determines the atom. Helium, for example, produced by the explosion of hydrogen atoms, is composed of two neutrons and two protons. When we proceed with nuclii till we reach the heavy elements represented in uranium, for instance, we find that the

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(1) This small and simple collection in the world of atoms reminds us of its counterpart in the Greater World which includes the earth around which revolves the moon. This is a proof and support to the Qurân's verse: "Thou seest no incongruity in the creation of the Beneficent." (Sûrat Al-Mulk: The Kingdom).

nucleus of this element is composed of 92 protones with 146 neutrons. Normally, negative charges inside any atom are equal to their positive charges. This is why the electrical charge of an atom equals zero. The helium atom is composed of one nucleus and two electrons (or negative electricity) which produce electrical equilibrium. But as regards the uranium atom, ninety two nuclii revolve around it. Electrons go round nuclii in different orbits which increase with the rise in electrons, as each orbit will be saturated with a certain number of them. The nearest of orbits to the nucleus has no room but for two electrons. The following orbit has eight electrons, and so on. What is left over from the saturation of the inner stratas remains in the outer ones. This is which could be easily separated and reorganised.

It is possible that one electron or more may be separated from the atom. This will release two charges, one positive and the other negative. This process is scientifically called "ionisation". The most simple apparatus in which the process of ionisation takes place is the electric discharge tube used in lighting or advertising in which the gas glows under very low pressure resulting from the collision of electrons with gas atoms. This collision with some particles results in adding energies which are released in the form of light, which in its turn is the source of the glow known to us ; while some other atoms are ionised.

A few years ago, new discoveries had been made in the material world as regards the formation of the atoms. These discoveries were of much importance to scientists, particularly astronomers. The most important of them was the discovery of the negative proton (the opposite to the proton known to us) and the posi-

tive electron (the opposite to the one familiar to us). This means that there are two different kinds of matter of which stars, the sun, planets and other various bodies are formed. If one of these two kinds meets the other or collides with it, atomic destruction takes place, the result of which will be the disappearance of the whole matter from existence and the release of huge energies. We, for instance, may describe the first kind of these two matters, that of positive protons and negative electrons, as "M"; the second and opposite kind, of negative protons and positive electrons, could be named as "S".

Astronomers have benefited from those discoveries in the potentialities and the different applications involved in them, which explained the mysteries of a number of this universe's phenomena. Due to these discoveries, astronomers were able to explain completely dark parts in galaxies, especially in the spiral nebulae, and were also able to know something about noval and supernoval.

There are some electrically-charged particles in the nuclii of heavy atoms. These are called masons. If a proton is transferred to a neutron, the former loses its positive charge, which will be separated with the separation of a positive mason. But if a neutron changes into a proton, the mason, in this case, will have a negative charge. When a positive proton collides with another of a negative nature, or if a negative electron collides with a positive one, one completely destroys the other. The total energy will be released in this case.

From this we can easily realise that when one atom of matter "M" enters the orbit of matter "S", or vice versa. electrons become extinct or vanish first, then the

protons. However, we do not know, even approximately, whether the number of positive protons contained in the universe is completely equal to the negative protons of it. But a host of scientists believe that such a case should exist in a world created from nothingness. It will be the same result to be got if it happens that galaxies meet and collide with each other. This discovery may cast light on the exalted verse :

"Surely Allah upholds the heavens and the earth lest they come to naught. And if they come to naught, none can uphold them after Him. Surely He is ever Forebearing, Forgiving." (Sûrat Fatir : The Originator).

Anyhow, the possibility of the disappearance of heavens and the earth is a problem which science can not deny as we have already seen. This could be stated despite the fact that we are unable to confirm that positive and negative protons had come into existence as big numbers of pairs which became separated into single ones of which the total charge did not exceed zero, or that all such things had been formed as separated and single particles. It is also a fact that nobody had admitted that protons and electrons were regularly distributed among all parts of the universe. The possibility of securing electrical equilibrium, by the passage of time and at a certain place, between negative and positive charges, could be proved by witnessing it.

There are other verses which have rather the same meaning. These verses reveal the secret of the beginning and the end of this universe. Of them are the following :

"On the day when the earth will be changed into a different earth, and the heavens (as well)." (Sûrat Ibrahim : Abraham).

"The day when We roll up heavens like tne rolling up of the scroll of writings." (Sûrat Al-Anbiya : The Prophets).

"And when the heaven has its covering removed." (Sûrat Al-Takwir : The Folding Up).

# THE QURAN AS THE BEST EXAMPLE OF SCIENTIFIC EXPRESSION

We have stated that the inimitable nature of the Holy Qurân's elocution makes itself more prominent when the Book describes with scientific precision a matter pertaining to the universe. This shows unmistakably the authenticity and truth of the Revelation. One of the striking examples of the same is the Qurânic verse which was included in Sûrat Yunus (Jonah): "Until when the earth puts on its golden raiment and it becomes adorned, and its people think that they are masters of it, Our command comes to it, by night or by day." There could be no better and clearer expression than this one which describes the future of humanity on earth. Was not this verse which gave prior information of the coming event of the dawn of civilisation ? Actually, it was the most true picture given beforehand of the landmarks of civilisation, its merits and beauties and the different shapes it takes in different parts of the world. This Qurânic verse gives us an idea about the enormous power of science which Man has begun using on earth, to exercise control over space, to subdue rivers and oceans and to dynamite hills and hillocks.

The Holy Qurân's was a correct foretelling. Man has today really gained in knowledge and has acquired control on Mother Earth. Earth receives Allah's directive. But when ? At what time ? The verse which was revealed fourteen centuries ago says the time can be

night or day. This expression in particular is superb and very precise. We know that when it is night-time in one hemisphere, it is daytime in the other. That means that any event may take place in a particular moment of time which can be night time as related to a particular hemisphere and at the same time it can be daytime as related to the other. This is an indisputable scientific fact and could not possibly be open to alteration in any case. That is actually a piece of most precise description of a scientific issue and it constitutes a proof of the inimitable elocution of the Holy Book which we ought to bring into prominence to let the Believer gain further firmness in his faith and to show an aspect of the wonderful Qurânic elocution even in the description of scientific matters.

The following verse from Sûrat Al Raad (The Thunder) is one Qurânic expression which helps science to interpret a fact : "Allah is He who raised the heavens without any pillars that you can see."

If we consider the sky a name given to anything which is over our heads, then it will surely mean the entire universe which surrounds us and which begins with the space around the earth followed by the planets, the Sun and other stars found in the depth of the space, in our gallaxy or in the other gallaxies. All these heavenly bodies move in their orbits.(1) This is the sky. It is created by Allah and each body in the space is similar to the brick in its lofty structure. All these heavenly bodies split one after the other and are held in

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(1) **"All revolve in orbits" (Sûrat Al-Anbiya: The Prophets). "Nor can the night outstrip the day. And each revolves on in an orbit." (Sûrat Yasin).**

their relative positions by centrifugal force and universal gravity. This gravity and this centrifugal force, produced by rotation in semi-circular orbits or ellipses, could be treated as actually-built pillars. Although we may not detect such forces with our eyes yet that does not mean that they are not there in any case, since we can measure and give their specifications correctly. If anyone of us is granted a suitable sense in addition to the normal ones we have, he will be able to feel these (tubes of force) exactly as we can feel any material body with our normal senses.

The blue sky which appears over our heads during daytime has no material existence. It is nothing more than the result of the scattering of sunlight in the atmosphere, exactly as the small sea waves crash on the rocks of the shore, and later, scatter in all directions. It is scientifically known that in the earth's atmosphere most sunrays suffer a scattering effect, which is the result of particles of the air, water, vapour and the small hardened bodies which are carried by different currents of air. It is also known that the scattering of light cannot be complete except for such waves the lengths of which are the shortest possible in the solar beam which is sent out by the sun. The amount of energy which gets scattered becomes inversely proportional to the fourth power of the wavelength scattered, in a way that if two waves the length of the first being 0,6 micron (1) and the second 0,5 micron, the ratio of the scattered energy in the second case as related to the scattered energy of the former case will be approximately :

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(1) The micron is a unit for measuring short waves like the ether waves represented by light or X-rays for example. This unit is equal to one part out of ten thousand parts of the known centimetre.

$$\frac{6 \times 6 \times 6 \times 6}{5 \times 5 \times 5 \times 5} = \frac{1296}{625} = \frac{2}{1}$$

The blue waves, or the waves of blue colour, sent out within the solar beam, are very rich due to the temperature of the radiating surface of the sun, which amounts to 6,000 absolute or slightly less. Moreover, these blue waves are amongst the shortest lengths of all light waves. As soon as they enter the atmosphere of the earth they get scattered ali over and cover the space with big amounts of blue colour. This makes the sky appear as a blue dome over our heads, despite the fact that this dome has no existence as that of a material body or a hard sky, as some may tend to think. This blue sky is nothing but a light phenomenon as had been already described.

Those who are engaged in the nature of space do not require any new proof to get to this fact. But still we can give below some examples to facilitate understanding the problem :

1) The blue sky can change into red or yellow at the scattering of a greater amount of the yellow or red rays of its solar beam. This can happen under the effect of scattering comparatively big-sized particles or drops of water produced in the lower air strata. This is exactly what happens at the time when dust or sand storms blow or when you look at the horizon at sunrise or sunset while non-thick and low uncondensed clouds are scattered around it.

2) The source of light in the atmosphere itself (or the sky) during daytime are the rays scattered in all directions. The most clear proof of this phenomenon is that if you open a window which does not face the sun at all, i.e. looking to the north, there will be no doubt that this window, which does not get sunshine direct, can fill the room with the light of the day. From where did the light come and how did it enter ? The answer is simple : light comes through the scattered rays spread everywhere.

3) If we climb up in the higher strata of the atmosphere to come out of the air cover (at a distance of one hundred kilometres from the earth's surface) the blue sky will appear below with the stars shining in it in daytime. At the same time, the big space will appear dark, in which stars will be seen shining. The sun will be so prominent and its rays will be piercing exactly like needles. They may have a noise as a result of gigantic storms sweeping its outer space.

There is no doubt that the Holy Qurân differentiates between the word "sky" and the other one "heavens". These words have been used in it in more than 300 verses. We shall know, as we proceed, that the word "sky" is used as a common expression for everything which is over our heads, including the earth's atmosphere in which clouds of a different nature move, and also the rain-laden clouds such as cumulo-nimbus and cumulus which grow vertically due to particular natural conditions. The Holy Qurân did not, in any way, mean

by sky or heavens the blue dome seen by human beings since the beginning of existence, and which captured their imagination too. This is one aspect of the inimitable elocution of the Holy Qurân which excels precisely in describing scientific issues. This may not be surprising since its Revelation came from the All-knowing, All-embracing Almighty.

Clouds rise towards the sky and cover the sunshine, while rain and hail drop from them. Their structure may get charged with electricity under particular conditions. This phenomenon is accompanied by electrical discharge between different parts of a cloud which is yet forming up or among other clouds. This discharge produces fearful electric sparks called lightning. If the discharge takes place between the cloud and the surface of the earth, in this case it takes the name of "thunderbolt". It is known that quick expansion of air due to sudden heat which causes lightning is accompanied by inter-pressure and low pressure in space, which is thunder. As far as the continuous noise of thunders is concerned, the source of this comes from the reflection of the thundering noise in a series of cloud bases and heights, and the like. It is clear that rain is the source of sweet or fresh water on earth, and for this, it makes the backbone of life. It is the sweet water which gave prosperity since ages. This has been fully described by the Holy Qurân in different verses and different ways. The "sky" and "clouds" and "heavens" have been mentioned in several Qurânic verses. Of these are :

In Sûrat Al-Baqara (The Cow) :

"Or like abundant rain from the cloud in which is darkness, and thunder and lightning."

"And sends down rain from the clouds then brings forth with it fruits for your sustenance."

"And the water that Allah sends down from the sky, then gives life therewith to the earth after its death."

"And the changing of the winds and the clouds make subservient between heaven and earth."

In Sûrat Al-Imran (The Family of Imran) :

"Surely nothing in the earth or in the heaven is hidden from Allah."

In Sûrat Al-Anaam (The Cattle) :

"And it is He Who sends down water from the clouds, then We bring forth with it buds of all (plants)."

"And whomsoever He intends to leave in error, he makes his breast strait (and) narrow as though he were ascending upwards."

We will be justified if we pause here a little to question our own selves as to who had informed the Prophet about this natural phenomenon the secret of which had not been discovered unless after a period of more than one thousand years beginning from the date of Revelation, and after scientists climbed up the higher strata of the atmosphere in balloons, and planes and the like, and studied the nature of air with the help of apparatus and instruments ? Later, they formed their theories and laid down rules.

It is a fact that to climb up the sky means lessening of the atmospheric pressure which entails the lessening of oxygen which we inhale in a way that it will not

suffice for the requirements of life, neither in quality nor quantity. This produces uneasiness in the chest for anyone going up in the first stages of climbing. Later, such a man will face sure death. At a height of 19 kilometres, human blood bursts forth from the body pores as if it was boiling.

In Sûrat Al-Anfal (Voluntary Gifts) :

"And sent down upon you water from the clouds."

"If this is indeed the truth from Thee, then rain down on us stones from heaven."

In Sûrat Yunus (Jonah) :

"The likeness of this world's life is only as water which We send down from the clouds, then the herbage of the earth, of which men and cattle eat, grows luxuriantly thereby."

"Say : Who gives you sustenance from the heaven and the earth."

"And not the weight of an atom in the earth or in the heaven is hidden from thy Lord."

In Sûrat Hud :

"And it was said : O earth, swallow thy water, and O cloud, clear away."

"And, O my people, ask forgiveness of your Lord, then turn to Him, He will send on you clouds pouring down abundance of rain."

In Sûrat Ibrahim (Abraham) :

"And sent down water from the clouds, then brought forth with it fruits as a sustenance for you."

"And nothing is hidden from Allah, either in the earth, or in the heaven."

In Sûrat Al-Hijr (The Rock) :

"And certainly We have made strongholds in the heaven, and We have made it fair-seeming to the beholders."

It is known, however, that early astronomers divided the sky stars into 90 groups, or constellations. Included in this huge group was an imaginary belt which included in turn the zodiacs that pass by the earth followed by each other, in order to complete the circulation in one full year. This phenomenon applies to all members of the solar system since they also move from one zodiac to another. Zodiacs are : Aries, Taurus, Betelguese, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Pisces.

At any rate, we can see that this type of man-made division was more akin to picturisation or decoration which was rather the outcome of fancy and not correct scientific procedure. The division of the sky stars into groups, having particular and known shapes, was a wonderful act of drawing or painting which represented some stories and beliefs. But, since they were painted and drawn in a particular way, their characteristic shapes were liked by the people. There is no doubt, scientifically speaking, that these shapes remain preserved for ever in the minds of the viewers from the earth. This is due to the fact that stars are away from

us by distances beyond imagination and description. All these meanings are likely to be found collectively in the Holy Verse put in an inimitable elocution and couched in a purely scientific style.

In Sûrat Al-Hijr (The Rock) this verse is also found: "And We send the winds seeding (or fertilizing), then send down water from the clouds, so We give it to you to drink", on the one hand, the verse may be regarded to show us that the winds, which had been discovered by our age's botanists and found to be an important factor in fertilizing most of the plant—these winds were mentioned by the Holy Qurân centuries ago as fertilizing agents. Winds, on the other hand, are also the basic factor, if not the first factor, which stir clouds, seed them with nuclii of condensation, and accumulate them in the sky to rain. The most wonderful thing in this connection is that the Holy Qurân always connects the falling down of rains from the sky with sending winds together, which gives meaning for blowing. The scientific expression is convergence. It is an accomplished fact that these two natural phenomena are linked with each other. This phenomenon is the basic principle upon which stands the explanation of heavy precipitation. It is established now that rainfall is accompanied by the process of the rise of the air upwards by convergence or convection or similar factors. Later, air gets cold due to expansion. This is scientifically known as adiabatic cooling. When air expands, it occupies greater volumes as a result of the low pressure which takes place in the higher strata of the atmosphere. Its temperature drops automatically at the expense of the energy of its particles, and vice versa. When air gets cold, its ability to carry water-vapour drops too. The

continuation of this process, i.e. the continuous climbing up to the higher strata of the atmosphere and self refrigeration, makes it too feeble to carry water-vapour. This makes the latter accumulate in the shape of drops or snow crystals inside clouds. These particles gradually begin growing under suitable conditions until the up-growing air current loses capacity to carry them. This is the stage when they drop as rain or hail or as any other form of 'heavy downpours which come from the sky to enliven the earth after its death. All this is a result of the process of adiabatic cooling which accompanies the up-growing air current. But, of course, during the days of Muhammad nobody could even dream of the air carrying water in the form of water-vapour !

If we go deep in our study of the verses which describe this phenomenon, we find that, taken in its totality, it forms the basis of meteorology. Moreover, the Holy Qurân urges human beings to think and realise the Creator's power over everything. Take for example the following verse which appears in Sûrat Al-Baqara (The Cow). It says : "In the creation of the heavens and the earth, and the alternation of night and day, and the ships that run in the sea with that which profits men, and the water that Allah sends down from the sky, then gives life therewith to the earth after its death and spreads in it all (kinds of) animals, and the drifting of the winds and the clouds between heaven and earth, there are surely signs for a people who understand."

Does not this verse differentiate between astronomy, meteorology and biology? Does it not draw attention to all that? Read this verse taken from Sûrat Al-Nur (The Light) : "Or like darkness in the deep sea-there covers him a wave, above which is a wave, above which

is a cloud — (layers of) darkness one above another — when he holds out his hand, he is almost unable to see it. And to whom Allah gives not light, he has no light." From this verse it could be seen that the description of darkness and its piling up under particular atmospheric conditions is a wonderful picturisation the style of which is inimitable as far as the precise scientific description is concerned.

The following verse is included in Sûrat Al-Nur (The Light): "Seest thou not that Allah drives along the clouds, then gathers them together, then piles them up, so that thou seest the rain coming forth from their inside ? And He sends down from the sky mountains, wherein is hail, afflicting therewith whom He pleases and turning it away from whom He pleases. The flash of his lightening almost takes away the sight."

This is a verse which defines the nature of cumulus clouds which grow with their cliffs piercing through the atmosphere up to the sky. They look like mountains and drop hail or snow balls of varying sizes, the size of one of them may equal the size of an orange. It is known that when the smaller snow particles grow inside cumulus they get charged with electricity. This means that the process of getting charged with electricity cannot be completed except at the actual availability of snow formations inside clouds. Later, they grow quickly under suitable weather conditions, the most important of which is the intensity in the vertical air currents. This is what the verse says and draws the attention to, as if the Prophet Muhammad was a giant of meteorology.

In Sûrat Al-Rum (The Romans) there is another verse which most clearly and scientifically points to the

formation of precipitation, the basis of which is the directing of winds to accumulate and climb upwards.(1) The verse is this: "Allah is He Who sends forth the winds, so they raise a cloud, then He spreads it forth in the sky as He pleases, and He piles it, so that you see the rain coming forth from inside it; then when He causes it to fall upon whom He pleases of His servants, Lo! they rejoice."

In Sûrat Fatir (The Originator) there is another verse which reads as follows: "And Allah is He Who sends the winds, so they raise a cloud, then We drive it on to a dead land, and therewith give life to the earth after its death. Even so is the quickening."

This verse shows that after admitting this important scientific fact, the Holy Qurân once again reminds people how rain resuscitates earth after its decay, which proves that resurrection could take place later.

The following verses are included in Sûrat Al-Nahl (The Bee):

"He it is who sends down water from the clouds for you; it gives drink."

"And Allah sends down water from above, and therewith gives life to the earth after its death."

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(1) Convergence due to the coming of winds from all directions to a particular place is the main phenomenon which causes downpour. The author of the book assessed the amount of air which rises as a result of the process of convergence in case rain falls accompanying depression in the eastern area of the Mediterranean during winter (The Cyprus Atmospheric Depression, as it is called by the writer) and found equal to 70,000 cubic kilometres per hour. This helps us, and clarifies the meaning of the term convergence referred to in this book. It means that wind is released from all, or most directions surrounding one particular zone in order to accumulate there. From this point the air gets cold due to ascent and the result will be the fall of continuous rain.

From Sûrat Al-Kahf (The Cave) the following could be quoted :

"And will send on (thine) a reckoning from heaven so that it is dust without plant."

"And set forth to them the parable of the life of this world as water which We send down from the cloud."

In Sûrat Taha :

"And sent down water from the clouds. Then here-by We bring forth pairs of various herbs."

This means that water which falls down from the clouds, despite the established fact of its chemical composition according to the diversity of localities, is capable of producing varieties of plants. This is a sign of the omnipotence of the Creator and it bears testimony to His limitless might and power.

In Sûrat Al-Nur (The Light) another verse says : "And He sends down from the heaven (clouds like) mountains, wherein is hail."

Hail,(1) granted by Heaven, is formed inside cumulus growing in a vertical direction. These clouds are those which go upwards, under special atmospheric conditions, with summits like mountains. Despite the assorted kinds of clouds and their characteristic diversities, the holy verse, mentioned above, refers specifically to

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(1) Hail is different from snow which falls on cold zones. It is a usual natural phenomenon seen in most parts of the globe, particularly in damp hot areas. During heavy storms, hail's size may equal that of pomegranates. Falling on earth, it destroys harvests and may kill cattle. But usually, hail's size does not exceed the size of a small nut. In Egypt, hail is called "the salt" and falls down together with rain in winter.

the possibility of the coming down of hail from cumulus, which is an indisputable scientific fact.

The Qurân again says in Sûrat Al-Anbiya (The Prophets) : "He said : My Lord knows (every) utterance in the heaven and the earth."

It behoves us if we pause here a little longer to ponder over the deep meanings of this verse which has a clear bearing on a scientific fact. The phraseology used is simple but notable. The verse states that in heavens there are utterances, which means that in heavens there should be creatures which speak or talk. Here, we may take the term "talk" to mean different methods used by all creatures, those endowed with reason and others without it, such as insects,(2) for communication with each other. We can take such utterances as statements made by human beings and consider them as a factor distinguishing creatures with reason from creatures without it. At any rate, in all parts of the skies and heavens there are creatures which resemble those living on earth. And if there are planets in our solar system or in other systems floating in space, whose climate and environment favour the existence of life and its development in a way comparable to life on earth, this verse, then, gives information about the

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**(2) Insects are the most superb creatures known on the surface of the earth. Nothing could deter their progress towards development except the absence of an inner bone structure within their bodies. Another obstacle is their respiratory system. Some one million years ago, insects reached the pinnacle of their grandeur. They set up social units and colonies in which the individual was subordinate to the general interest and where it was assigned a particular duty to perform. Examples of this are ants, bees and the concentrations of white ants which lived right from the end of the ancient periods of life up to this day, without any change or development worth mentioning.**

existence of life in them. This means that creatures created of materials known either on earth or in other planets, are numberless. The Holy Qurân stands unique among other holy books in giving this important statement which informs human beings that they are not the only living beings.

If we speak about the existence of life in other planets, we should not forget that a host of scientists gives assurances that life, whenever it exists, should rely on the existence of the carbon atom and its deri vatives as well as big quantities of water in which such compounds will dissolve.

Sûrat Al-Anbiya (The Prophets) mentions : "And We made from water everything living." Scientists admit that carbon is the sole element which builds bodies, as it yields various compounds produced by complicated series formed of its particles. Carbon constituents always need specified amounts of heat in order to be kept intact. It is noticed that under very low temperature, these constituents cannot unite. At boiling point, most of them disintegrate. If this is the case, suitable temperature has to be the most important element in keeping life everywhere.

It is a fact that carbon constituents can dissolve in liquids other than water, whatever will be the way used and the degree of softness. Although carbon chemistry has been carefully studied, yet nobody could be aware of the limit of this element's potentialities. Some scientists conceived that many other kinds of life may appear under circumstances different from those found on earth. It is known, for instance, that carbon and cilica compounds, are numberless. They can survive high

temperature. This shows that big planets, having thick atmospheres, should have more chances for the formation of such compounds, and probably the existence of living creatures.

If we try to define the shape or form which developed races living outside our planet will have, we should, in this case, and without inviting complications act on the assumption that nature has made no dissimilarity whatsoever in its methods.(1) Accordingly such creatures, in their attempt to make a good show, share with us the following :

1) The body's reliance on an inner osteology made of hard material.

2) The existence of a main centre for nerves (the brain) and a net which communicates to various parts of the body directives (the nerves).

3) The best shelter for the brain which exists inside a safe movable organ either in the fore or the top part of the body. This organ also contains the main organs of sensation, such as the eyes which are found whenever light is abundant, ears whenever sound waves are conducted everywhere, nose, tongue, etc...

4) Creature's dependence upon legs used in motion.

5) The existence of a mouth for speaking and feeding. In certain cases, some creatures use

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(1) "Thou seest no incongruity in the creation of the Beneficent." Sûrat Al-Mulk.

signals only, while others use drawing or suggestive devices.

From the Qurânic verses which refer to the fact that on near and far planets there are surely creatures are the following :

"Seek they then other than Allah's religion ? And to Him submits whoever is in the heavens and the earth." — Sûrat Al-Imran (The Family of Imran).

"All those in the heavens and the earth ask of Him. Every moment He is in a state (of glory). — Sûrat Al-Rahman (The Beneficent).

"And thy Lord best knows those who are in the heavens and the earth." — Sûrat Al-Israa (The Ascension).

"There is none in the heavens and the earth but comes to the Beneficent as a servant." — Sûrat Maryam (Mary).

"Seest thou not that to Allah makes submission whoever is in the heavens and whoever is in the earth." — Sûrat Al-Hajj (The Pilgrimage).

"Seest thou not that Allah is He, Whom do glorify all those who are in the heavens and the earth." — Sûrat Al-Nur (The Light).

"Say : No one in the heavens and the earth knows the unseen but Allah." — Sûrat Al-Naml.

"And the day when the trumpet is blown then those in the heavens and those in the earth will be struck with terror." — Sûrat Al-Naml.

"And the trumpet is blown, so all those in the heavens and all those in the earth will swoon." — Sûrat Al-Zumar (The Companies).

"And He is whosoever is in the heavens and the earth. All are obedient to Him." — Sûrat Al-Rum (The Romans).

"And of His signs is the creation of the heavens and the earth and what He has spread forth in both of them of living beings. And He is All-powerful to gather them together, when He will." — Sûrat Al-Shura (The Council).

"And to Allah makes obeisance every living creature that is in the heavens and that is in the earth, and the angels (too) and they are not proud." — Sûrat Al-Nahl (The Bee).

The last verse may be one of the clearest verses of the Holy Qurân which differentiates between angels and other creatures living in the heavens. The latter may also include occupied planets or others on which material creatures live as in the case of the earth. Heavens were again mentioned in Sûrat Al-Hajj (The Pilgrimage) as follows :

"And whoever associates (aught) with Allah, it is as if he had fallen from on high, then the birds had snatched him away."

"Seest thou not that Allah sends down water from the cloud, then the earth becomes green."

"And He withholds the heavens from falling on the earth except with His permission."

Celestial bodies are of different sizes and forms. Among them are suns, stars, planets as well as meteors and meteorites. All of these bodies run in orbits and are bound by gravity. The earth may intervene in one of the meteorites' paths in space, when floating around the sun. Some of these meteorites run at a speed of about 45 miles per second, and for this reason, it is estimated that any meteorite which weighs one fraction over one thousand of only one gramme can run in to that of a gun's bullet. Although the size of such a meteorite will not exceed at all the size of one particle of sand, it causes direct injury, in case it collides with a human body, no less in damage than any resulting from a direct fireshot.

Thousands of millions of such bodies fall without indulgence every day down to the upper atmosphere of the earth, when the latter penetrates their paths. But these meteorites soon evaporate or burn out. This takes place at a distance ranging from 80 to 100 kilometres far from the surface of the earth as a result of the generating of immense heat due to resistance of the upper atmospheric cover. It is needless to say that quick traction causes immense heat which causes in turn the evaporation of meteorites and setting them on fire. For this reason, these celestial bodies do not reach the earth's surface. The atmospheric cover protects us from their dangers. The same happens to meteors, but because of the big size of some of them, meteors sometimes reach the earth. Among the known meteors which feel down to the earth is the Big Siberian Meteor which fell in 1908, shaking the surface of the earth and causing great damage in a circle more than 40 kilometres in diametre. Again, the meteor which fell down on

Arizona, America, was responsible for a crater in the crust of the earth of more than one mile in diametre and 200 metres deep. It happened that when this meteor collided with the earth's crust, it exploded and its splinters flew away in all directions in the form of other meteors.

Naturally, meteors are to be considered as a great threat to universal space travellers. The story of the meteors which follow devils trying to go upwards in the skies is not new. The Holy Qurân, in Sûrat Al-Jinn, tells us of something which happens in the invisible world as follows: "And we sought to reach heaven, but we found it filled with strong guards and flame. And we used to sit in some of the sitting-places thereof to steal a hearing. But he who tries to listen now finds a flame lying in wait for him."

It also says in Sûrat Al-Rahman (The Beneficent): "O assembly of jinn and men, if you are able to pass through the regions of the heavens along the diameters of the earth, then pass through. You cannot pass trough but with authority. Which then of the bounties of your Lord will you deny? The flames of fire and sparks of brass will be sent upon you, then you will not be able to defend yourself."

This holy verse reveals to us a number of secrets about the space. It tells us that universal space is not an absolute vacuum in the real sense. In fact, space is full of electrons and nuclii of elements without which life cannot exist at all. Observations from universal space did not become available to people except in this era of space and satellites. It was discovered that around the earth there are complete bands or belts containing big assemblies of electrones kept in space under

the effect of the earth's magnetic field. These electrons are ejected from the sun with great energy. No living body can expose itself to such bands nor penetrate them without great precautions. Till now, little has been known about the success achieved by living creatures in going through such belts. Scientists give most of the constituents of space bands the name of "cosmic rays". This name might have been given because some of these rays and electrons come from distances deep in space. Here, again, the atmospheric cover of the earth hinders such rays from reaching us.

The Qurân also mentions the earth's evolution and the amounts of matter it contains. In this respect the following verse appears in Sûrat Al-Muminun (The Believers) : "And We sent down water from heavens according to a measure, then We caused it to settle in the earth."

This means that water found on the earth was not given aimlessly. It was given in measured quantities and for particular reasons. The earth, with its water, has a certain function to fulfil as the dwelling place for Man, the image of God. Some people wrongly think that in covering most of the earth's surface with oceans and seas there had to be much prodigality. The fact is contrary to that. It is the oceans that regularise the distribution of the main heat on earth. They are effective media for the fair distribution of solar energy received by the earth.

Oceans and seas could be regarded as big reservoirs for heat storing the sun's energy which is gained by different ways in places where it could be found in abundance, such as in the tropics. These reservoirs

give heat to areas in need of it or in times of scarcity. Without oceans and seas, earth could have become a planet with maximum and minimum degrees of temperature and the bodies of living creatures could not have endured life in such very hot and very cold regions. Oceans, which cover more than three quarters of the earth's surface, prevent such things from happening by virtue of the natural characteristics or properties they have.

Despite the fact that oceans are so wide, as we have already stated, we still suffer in continental areas far from oceans, from the differences resulting from the maximum and minimum degrees of temperature. In the midst of Siberia, temperature may reach 70 degrees centigrade below zero in winter, while in the midst of the deserts of the two big tropics temperature reaches 50 degrees centigrade above zero in summer. This fact stands as good proof of the part played by oceans in mitigating and regularising heat.

For this reason, the midst of Siberia, and not the geographical Pole familiar to us, should be considered as the northern heat pole. The fact that oceans create proper and suitable climates for life could also be seen from our examination of the clear climatic differences in both regions of the North and South Poles. The North Pole is nearly a closed sea while in the South Pole there is a dry land surrounded by ocean from afar.

As a result, the Antarctic Circle becomes barren and covered by snow all over the year. Temperature, there, scarcely leaves the zero degree. On its exposed-to-storms rocks no plants could grow except mushrooms and fungus. Some kinds of birds and microscopic

insects could be found there. But the Arctic Circle is something different. Near this region's edges, temperature, in summer, goes up to reach a level which enables certain plants, such as Tundura plantations and numerous varieties of flowers, to grow. The more the sea goes northwards the better the climate will be. All this is due to the natural characteristics of water.

As regards the entire space the Qurân says: "Blessed is He Who made the stars in the heavens and made therein a sun."

Zodiacs, as we have already mentioned, are composed of assemblies of stars as seen from the earth. The sun under which we live is not so relatively distant. It is a big star of a diametre of more than one and one third millions of kilometres. In this, its diametre exceeds in length that of the earth by one hundred times. The sun resembles a lamp which sends light and heat. Its radiating surface reaches a temperature of 6,000 degrees centigrade. This heat increases immensely and swiftly near its centre where it amounts to more than 20 million degrees centigrade. The reason for this is that the constituents of the centre are exposed to heavy pressures beyond imagination. The sun, as a lamp, is again mentioned in Sûrat Nuh (Noah) as follows: "And made the moon therein a light, and made the sun a lamp."

From the sun burst forth inflammable gases to altitudes of thousands of kilometres. Among those flames going upwards are the sun spots. They are giant storms which take place in the atmosphere of the sun. Any of these storms' diametre may measure about 50,000 kilometres. Usually, such storms are followed by

the propagation of magnetic and electrical waves in space which will be accompanied in turn by magnetic storms on the earth. These storms spoil and jam wireless and radio operations.

Before entering the earth's atmosphere solar radiation is composed of different proportions of ether waves of different wavelengths or characteristics. But most of them could be grouped in a band limited by two waves, one of 0.17 microns and the other about 4. The percentage ratios of the different constituents of the solar beam are as follows :

1) About 9% is ultra-violet rays. This ratio constitutes a band whose wavelength ranges from 0.17 to 0.33 micron. These rays which could not be seen by bare eye have great effect on living cells.

2) About 50% is light, which constitutes a band of radiations whose wavelengths confine to between 0.34 and about 0.8 microns. This band is the source of light scattered in daytime over the earth and its atmosphere. Thus, the sun is nothing but a body resembling a lamp which illuminates and heats the earth and its atmosphere, exactly as it has been mentioned in the Qurân. Illumination reaches its maximum degree at midday. In summer, light's intensity is double that of winter. In Cairo, for instance, light amounts to about 10,000 candle-feet in summer and about 5,000 candle-feet in winter. Candle-feet is the unit of light as it is known in the scientific field. To make this easy to comprehend, we would say that if we want

to easily and comfortably illuminate a big hall, we, in this case, will need 1,500 candle-feet. Sunlight has great effect on the growth of plantation and blossoms as they always require specified amounts of light.

3) About 41% is infra-red, or heat, rays. This constitutes a long band of wave ranging from about 0.8 to more than 4 microns..

The density of solar radiation on each square centimetre outside the atmosphere of the earth amounts to about 2 calories (1) per minute. This amount is called "the solar constant".

On entering the earth's atmosphere, solar radiation decreases gradually due to several reasons and factors found in the atmosphere of the earth itself. Among those reasons are the scattering of light, or the scattering by air particles and other small ones floating in the air, and the absorption by the atomic oxygen in high altitudes and by the ozone gas which is found at altitudes ranging from 15 to 45 kilometres.

The scattering of light is responsible for illuminating the atmosphere of the earth as stated before. This is called the daytime light. If we leave behind the earth's atmosphere and go upwards to the universal space, we will find it, despite the rising of the sun and its appearance in one of the sky's corners, dark. This phenomenon could be picturised as if the daytime is snatched from the night, the result of which will be

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(1) The calorie is the quantity of heat required to calorify one gramme of water for only one degree centigrade.

complete darkness. Originally, space is dark and daytime is nothing but an incidental matter which is illumination of the atmosphere by the scattering of light. This process does not occur except in the atmosphere of the earth and other similar planets. The Holy Qurân is sublime in mentioning this fact glorifyingly in Sûrat Yasin. It says: "And a sign to them is the night: We draw forth from it the day..."

Solar radiation changes on the earth's surface from one place to another, regularly and during the whole year. This occurs as a result of astronomical factors, among which are the following:

1) The angle of the sunray's inclination on a particular spot. Radiation becomes immense when rays fall perpendicularly on the surface of the place.

2) The distance between the sun and the spot given. The more the distance becomes short, the greater becomes the radiation density. But the effect of the ray's inclination is usually greater than the effect resulting from changes of distances. This is due to the fact that changes of distance are small relatively. The earth's orbit around the sun is not completely circular.(1)

Generally, solar radiation reaching the earth's surface changes according to altitudes. Big quantities of it go to the Equator, while small ones go to the Poles.

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(1) Distance between the earth and the sun changes regularly and during the whole year. In January, for example, distance amounts to 147 million kilometres, while in July, 152. Difference, as it is noticed, is of 5 million kilometres.

If the average heat day equals the average of the quantity of solar radiation taken in 24 hours from near the Equator, regardless of other factors, the quantity of radiation on various altitudes in the whole year, estimated by average heat day, will be as follows :

| Altitude : | 0 degree | 20 deg. | 40 deg. | 60 deg. | 80 deg. |
|---|---|---|---|---|---|
| Average : Heat Day | 365 | 345 | 289 | 208 | 157 |

The earth, in its revolution around itself, has an axis inclined at 23.5 degrees to its orbit around the sun. Virtually, solar radiation does not intersect the Equator normally except on 21 March and 22 September, when the night equals in time the day everywhere. After March 21, the sun, in the northern hemisphere, begins its ostensible migration to the north, the matter which adds to the length of the day and makes it longer than that of the night. This continues until the sun reaches the Tropic of Cancer (altitude 23.5 degrees to north), which is the maximum to which the sun can go northward. This takes place on June 21. On that day, radiation falls perpendicularly on the Tropic of Cancer. From there, the sun moves towards the south until it intersects the Equator on September 22. It continues to move southward till it reaches the Tropic of Capricorn (altitude 23.5 degrees to the south) on December 22. From there, it repeats its movement.

Since the sun constitutes one of the stars of our galaxy, which completed since its appearance in the universal space about 20 rotations around itself, it is estimated that the sun itself, together with the other members of the solar system, like the stars, run in a

speed equalling hundreds of millions of kilometres per hour. The Holy Qurân describes this fact as follows in Sûrat Yasin : "And the sun moves on to its destination : That is the ordinance of the Mighty, the Knower."

In Luqman : "He has made the sun and the moon subservient (to you) — each pursues its course till an appointed time."

In Fatir (The Originator) : "And He has made subservient the sun and the moon, each one moves to an appointed time."

Other Qurânic verses showing the sun and other planets' move are many. Besides, they show the state of balance and equilibrium among forces influencing it. For example, the Holy Qurân says in Sûrat Yasin :

"And all float on in an orbit."

In Al-Saffat (Those Ranging in Ranks) :

"And of His signs is this, that the heaven and the earth subsist by His command."

In Al-Saffat (Those Ranging in Banks) :

"Surely We have adorned the lower heaven with an adornment, the planets."

This shows that the assembly of planets which reflect back sun's light adorn the lower sky. If the verge of that sky is to be marked by the path of these planets, the nearest sky to us may contain the following :

*a)* The cover of the earth's atmosphere, including rainy and non-rainy clouds;

*b)* The near universal space, including atoms, particles, meteors, etc... which transverse the path of planets, including the earth. These bodies may also transverse any traveller in space. Almost all of the meteors burn out as soon as they enter the upper atmosphere of the earth, and in this case, they appear in the form of swooping stars. The Qurân says in Sûrat Al-Mulk (The Kingdom): "And certainly We have adorned this lower heaven with lamps and We make them means of conjectures for the devils." The same meaning came in a verse in Sûrat Fussilat (Things Made Plain). It says: "And We adorned the lower heaven with lights, and (make it) to guard."

Here one would enquire about the whereabouts of other stars. My answer to such a query would be that details about other skies have not been referred to in the Holy Qurân, and thence, we have to refrain from giving any prediction as regards the hidden world. But since that inquiry will be so important, I will try to quote most of the verses relating to the skies and heavens with their characteristics mentioned in the Qurân. This may lead us to a satisfactory answer to such a query.

In Sûrat Sad: "And We created not the heaven and the earth and what is between them in vain."

In this verse, one can realise that the space existing between the heavens and the earth is not void of material and other universal activity.

In Sûrat Ghafer (The Forgiver) : "Allah is He Who made the earth a resting-place for you and the heaven a structure."

In Fussilat (Things Made Plain): "Then He directed Himself to the heaven and it was a gas."

It is scientifically admitted that existence originated from hydrogen gas which existed in the universal space. Hydrogen is known amongst scientists as the "universal gas". This evolution of the universe was accomplished by a series of steps or developments accompanied by the gradual concentration of the universal gas by gravity, before it could take the form of nebulae, galaxies, stars or planets. The steps could be summarised and serialised as follows :

Universal gas — galaxies — stars — planets.

The density or concentration of the universal gas is so small that one atom of it could be found in a space equal to that of an ordinary match box. But, inspite of this, the existing quantity of that gas exceeds today the quantity crammed in all galaxies by one thousand times. This is despite the fact that the first development and evolution process which accompanied the existence of the universe took place thousands of millions of years ago. The reason for this may be that galaxies, though very wide and big, do not occupy in the limitless universal space except a small size only.

However, the sublime thing which this verse may be regarded to show is that the various bodies (floating) in the sky had begun in the form of a gas. This fact was almost endorsed by all theories of astronomy, whatever differences there were in details.

In Al-Dukhan (The Drought) this comes out : "So wait for the day when the heaven brings a clear drought."

In my view, this verse refers mostly to the Judgment Day and gives us one of its signs. It is, however, admitted that each star, or sun resembling ours, has to expand once before attaining stability. Our sun, in particular, did not pass by this stage and it is still in its early days. If it happens that it expands, its wild fire and inflammable atmospheric gases will then fill the near space and reach the earth. That is the meaning which the previous verse refers to. The same is also included in this verse : "And the sun and the moon are brought together."

In Al-Jathiya (The Kneeling) this verse could be found :

"And (in) the variation of the night and the day and (in) the sustenance which Allah sends down from the heaven, then gives life thereby to the earth after its death, and (in) the changing of the winds, are signs for a people who understand."

This verse, clearly, deals with the principles of astronomy, atmospheric physics and biology, and points out that science is the source of force and sovereignty and the basis of piety and faith.

In Sûrat Qaf : "Do they not look at the sky above them ? How We have made it and adorned it."

This, as the former verse quoted from Al-Jathiya, deals with the principles of astronomy. The same Sûra has another similar verse, it is : "And We send down from the clouds water abounding in good, then

We cause to grow thereby gardens and the grain that is reaped." If something is to be gathered from this repetition, it will be the importance the Qurân attaches to science and the need to give it priority.

"Heavens" also came in the following two verses included in Al-Zariyat :

"So by the Lord of the heavens and the earth... It is surely the truth, just as you speak."

"And the heaven, We raised it high with power, and We are expanding it."

The reference to heavens mentioned in this verse deals with, and explains, the borders of the visible universe and their vastness or expansion in the course of time. This phenomenon, or result, is the strangest of all scientific conclusions reached in the last years. Since the meaning of the verse is quite clear, no more explanation will be required. Its scientific elocution and eloquence could not be overlooked.

It is admitted that the big units of the universe, or galaxies, go far away from each other with high speed. Thus the universe increases in size or expands. The more galaxies go far away, the quicker their release in the limitless space will be. It was noticed that galaxies near our own recede at a speed of so many millions of miles every one hour. Other galaxies of greater distances do the same but at a speed exceeding 200 million miles every one hour. The speed of galaxies far away from our own galaxy by double of these distances approaches that of light. Beyond these limits, the speed of the receding galaxies may exceed the speed of light. As a result of this, light coming from such.

could not reach us. This means that they belong to the unseen universe. However, the limit between what we can witness in the material existence and what we cannot is the galaxy which recedes at the speed of light. Today, this galaxy is estimated to be far from our own by four thousand millions of light years !

In short, it could be said that due to the expansion of the universe in which we live, or due to the receding of its galaxies in the long run, the limits of this universe could be defined and determined at the verge or the sky after which magnifying glasses could see no more. This universe contains more than one hundred thousand millions of galaxies, all of which are separated and isolated from each other ! By the passage of time, and with the increase of the speed at which they recede from our own galaxy, those galaxies could disappear beyond the seen universe gradually. If such a thing takes place, we will live in a universe void of galaxies, except our own. But the fact is that such a thing will not happen and existence will not be so empty as we have imagined one day. On the contrary, it will still remain full of galaxies, as it is approximately seen today. The reason for this is that while galaxies going beyond seen limits disappear, new ones gradually show up, made of universal gas, which was responsible for the formation of old galaxies.

The universal gas already referred to is the main material for the formation of the universe. It does not become extinct at all and its quantities in our seen universe do not diminish. Hence scientists' query : From where does such gas come ? Does it come from infinite space, in continuous succession, to replace the shortage

in its quantities lost in the formation of new galaxies ? Or does it come from a hidden place ? Or, is it being created ?

Most of the clues and scientific evidences prove that the gas does not come from a specified place ; it is created. Sometimes, the atoms of this material are no more present, but, suddenly, they show up. This denotes that the procession of the formation of hydrogen is a continuous one, otherwise this gas would have disappeared due to its being accumulated and, later, exhausted, inside far galaxies. Hydrogen, also, accumulates inside stars and submits to great pressures due to gravity. This great pressure results in the rising of temperature in the formation centres of stars and suns to millions of degrees. Here, atomic operations become active and gas changes, under various pressures, to ashes of helium gas and other elements. The chain is completely irreversible, as it cannot act otherwise. The end of the process cannot, under any circumstances, become the beginning of new hydrogen. Obviously, the maintainance of the gas in the universal space till now, despite the interaction of all such factors, is no more than a clear proof that it is continually remodelled and formed. For this reason, the average of gas density in space remains unchanged.

However, it is a fact that the rate of the formation of the main material of the universe is very slow. Hydrogen does not appear in abundance at any specified place. Its rate could be equalled to that of the formation of one atom, in one year, inside a space equalling that of a big hall. Such a rate could not be measured nor experimentally observed. But it could be

mathematically counted. If such an account is to be applied to the space of the whole seen universe, the created material will result in the existence of unimaginable quantities. They will exceed million million million million million million tons every second ! This new material produces pressure and motion which result in turn the isolation of galaxies and the expansion of the universe.

In Sûrat Al-Tur (The Mountain) the following verse appears :

"On the day when the heaven will be in a state of commotion." Probably, a similar meaning is given by a verse in Sûrat Al-Rahman (The Beneficent):

"So when the heaven is rent asunder, so it becomes red like red hide." Searching for other verses dealing with the same subject we have :

In Al-Haqqah (The Sure Truth): "And the heaven will be cleft asunder; so that day it will be frail." This refers to the Judgment Day when the landmarks of this universe change.(1)

In Al-Maarij (The Ways of Ascent) : "The day when the heaven is as molten brass."

In Al-Jinn there is a verse which says : "And we sought to reach heaven, but we found it filled with strong guards and flame." This verse points out that

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(1) The following verses have the same meaning: "And the heaven is opened so it becomes as doors" — Al Naba (The Announcement). "And when the heaven is rent asunder" — Al-Mursalat (Those Sent Forth). "And when the heaven has its covering removed". — Al-Takwir (The Folding Up). "When the heaven is cleft asunder" — Al-Infitar (The Cleaving). "When the heaven bursts asunder" — Al-Inshiqaq (The Bursting Asunder). "By the cloud giving rain" — Al-Tariq (The Comer by Night).

meteors and cosmic rays, etc... which cross the universal space near the earth's path are among the grave sources of extinction any traveller in the space can encounter as soon as he leaves the earth's limits. Here, again, the meaning of the "to reach heavens" become also clear, as some of these meteors succeed in dashing through the earth's atmosphere and burn out at a distance ranging from 80 to 100 kilometres from its surface.

In Al-Maida (The Food) there is a verse which reads :

"And Allah's is the kingdom of the heavens and the earth and what is between them. He creates what He pleases."

This verse shows clearly that the universal space existing between various bodies in the sky is not void of everything, such as energy or ether waves. In it there are unseen particles which science has discovered lastly in the space age. In the same Sûra there is another verse bearing the same meaning ; it reads as follows : "And Allah's is the kingdom of the heavens and the earth and what is between them, and to Him is the eventual coming."

"Heavens" is also mentioned in the same Sûra as follows :

"Knowest thou not that Allah is He to Whom belongs the kingdom of the heavens and the earth ?"

"That is that you may know that Allah knows whatever is in the heavens and whatever is in the earth."

"Allah's is the kingdom of the heavens and the earth and whatever is in them; and He is Possessor of power over all things."

In Sûrat Hud a verse says: "And He it is Who created the heavens and the earth in six periods."

This verse denotes that existence was created at a certain time and that it also took a specified period to complete. Formerly, we had given many verses bearing the same meaning.

The second law of Thermodynamics points out that the universe could not be infinite in time; on the contrary, it had started at a specified time. Heat is always being transferred from hot material bodies to cold bodies. This process cannot be reversed and heat, accordingly, cannot return from cold bodies to hot bodies. The universe has to approach a case when the temperatures of all bodies become equal and the source of energy disappears. As a result of this, chemical and physical operations, such as radiation and the exchange of heat energy between various bodies, discontinue and the phenomena of life in the universe completely vanish. But since life is still going on and chemical and physical processes are still in operation, the logical conclusion of all this is that this universe could not have started from immortal time, otherwise, all its energies should have been exhausted by the passage of time, and activities stopped everywhere. As far as the Thermodynamics is concerned, it could be seen that the universe had a starting point which did not go without limit. On the contrary, it was a limited beginning which started, as scientists have estimated according to different calculations, since 4 or 5 thousand million years. It

was also pointed and that the universe is still subject to a continuous process of expansion. The skies' verges surrounding us take today the shape of a circular universe which can extend to a point where its radius reaches : $4 \times 10^{27}$ to $5 \times 10^{27}$ centimetres. This equals a number of 4 or 5, followed by 27 zeroes. Light can cover such a distance in 4 or $5 \times 10$ years. The mass of this universe, including material and energy, was calculated to amount to $5 \times 10^{56}$ grammes (i.e. number 5, followed by 56 zeroes !).

Those were some of the references made in the Qurân to the heavens. From all the verses quoted, it could be easily noticed that the word "heavens" was given to everything we can see of the bodies floating in the skies, such as suns, stars and the planets going deep in the space, which form, with the earth, a consolidated unit which constitutes the whole material universe. The Holy Qurân, contrary to what some people believed, did not mean by this term the things hidden from us or the things hidden in the supernatural world, like ghosts and spirits.(1) This is a very important point as it shows the impotance Islam attaches to the material world. It urges us to make scientific and practical studies of such a world, in a way completely remote from speculation or imagination, and without indulging in unfeasible controversy.

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(1) In this study, I do not deal except with the questions admitted by material scientific experiments or with what could be subject to science itself. Questions beyond this, related to worlds unknown but to God himself and discussed only by Him or the Holy Prophet, are certainly beyond science's jurisdiction. These questions we have to take for granted as they relate to the Unseen referred to by God in the Holy Qurân as "It is a guide to those who keep their duty, Who believe in the Unseen." — Sûrat Al-Baqara.

It is high time now for us to face facts and stick to correct beliefs.

In addition to this, the Holy Qurân contains more of such verses relating to the universe, the narration of which will find no room in such a small space. But, instead, we will tell of some of them which are confined to the explanation of certain phenomena of the universe, or, scientifically speaking, nature's phenomena or laws. All these phenomena, of course, were neither seen by the Prophet personally, like those relating to physics and phenomena of seas, nor were they read by him in books.

## ANOTHER SET OF VERSES RELATED TO VARIOUS PHENOMENA IN THE UNIVERSE

1. — "Or like abundant rain from the cloud in which is darkness, and thunder and lightning." Sûrat Al-Baqara (The Cow).

This shows that clouds which give heavy rain are those which hinder light from crossing through. They are also usually accompanied by thunder and lightning.

2. — "Praise be to Allah, Who created the heavens and the earth, and made darkness and light." Sûrat Al-Anaam (The Cattle). The verse points out that darkness preceded light in this universe.

3. — "And He is Who has made the stars for you that you might follow the right way thereby in the darkness of the land and the sea." Sûrat Al-Anaam (The Cattle).

This verse shows in a miraculous and scientific inimitable expression how the stars, and not the other planets, are used in determining directions on land and how they are used by travellers in deserts and seas for guidance. Ancient Pharoahs, Greeks, Arabs and others knew many a thing about stars and their assemblies. They even were able to give some of them, as they were seen in the sky, different names, of various derivations, such as Arcturus, Spica and Sirius. They also gave their assemblies other names, such as the Ursa-Major (The Great Bear), Scorpio, Andromealae, Herculs, Aries, Leo

and others, till they reached in number 90, the number of zodiacs.

Because of the revolution of the earth around its circumference once every day, stars move in the sky from east to west. Some of them rise from all the directions of the eastern horizon, then they go high in the sky until they reach the maximum height when they cross the Meridian. Then, they start to go down till they reach the western horizon behind which they disappear. There are another set of stars which go to neither east nor west. These stars draw in their daily movement circles the centre of which is the Ursa-Major. The latter is the star usually found in the north. In the horizon of Cairo, this star goes high at a fixed angle of 30 degrees. It is this which navigators and travellers in deserts take as a guide to determine the north.

4. — "Or like darkness in the deep sea — there covers him a wave, above which is a wave, above which is a cloud — (layers of) darkness one above another — when he holds out his hands, he is almost unable to see it. And to whom Allah gives not light, he has no light." Sûrat Al-Nur (The Light).

This verse describes in a practical accuracy and literal harmony the storms of the seas, which were not known, of course, to the Holy Prophet.

5. — "Have We not made the earth an expanse, and the mountains as pegs ?" Sûrat Al-Naba (The Announcement).

"Expanse" here means the flatness of the earth which means, in turn, that it is the shelter and asylum

human beings seek in this world. The other section of the verse, which likens mountains to pegs which keep tents stand firm when fastened to them, is an inimitable scientific example which nobody can know its secrets except those well-versed in geology. After the advancements made by civilisation and after geology has become a factual subject, it has been discovered that without mountains the solid crust of the earth would have been generally unstable as a result of the continuity of disequilibrium between the molten interior of the earth and the high pressures fallen on its solid crust and the denudation factors it is exposed to. This will be discussed later in detail. But now we will give another Qurânic verses which bear the same meaning. They are :

"And the mountains, He made them firm." Sûrat Al-Naziat (Those Who Yearn).

"And it is He Who spread the earth, and made in it firm mountains and rivers." Sûrat Al-Raad (The Thunder).

"And the earth — We have spread it out and made in it firm mountains." — Sûrat Al-Hijr (The Rock).

"And He has cast firm mountains in the earth lest it quake with you." — Sûrat Al-Nahl (The Bee).

"And We made firm mountains in the earth lest it be convulsed with them." — Sûrat Al-Anbiya (The Prophets).

In the last two verses, mountains were clearly likened to firm things put on the earth which have to keep the balance of the earth's crust. This is, certainly, an inimitable scientific elocution of the Qurân which

was stated centuries ago but had not been known until in our age. There is no wonder in this as the Qurân will always remain the immortal and eternal miracle of all times.

In the same meaning Almighty God says:

"Or, Who makes the earth a resting-place, and made in it rivers, and raised on it mountains." — Sûrat Al-Naml.

"And cast mountains on the earth lest it should be convulsed with you, and He spread on it animals of every kind." — Sûrat Luqman.

"And He made in it mountains above its surface, and He blessed therein." — Sûrat Fussilat (Things Made Plain).

The term "above its surface" mentioned here refers to the solid crust and the rising of mountains and other heights on parts of it.

"And the earth, We have spread it out, and cast mountains." — Sûrat Qaf.

"And made therein lofty mountains, and given you to drink of sweet water." — Sûrat Al-Mursalat (Those Sent Forth).

The history of the earth, since its exterior crust began to mass and harden slowly after it was molten resembling the interior of it, is nothing but a series of violent revolutions which occurred on its crust successively, and resulted in more of the cases in the appearance of great sweeping floods which covered big areas in all the corners of the ancient continents. From that

time, fossils of living creatures remained buried in the crust of the earth till they were recently unearthed.

This theory is scientifically known as the "Theory of Precession". It may be taken to explain the different stories mentioned in all religions about the "Deluges" among which was that which took place during the days of Nuh (Noah). The distribution of continents and oceans to the globe, as they are seen today, was not the same of olden times. Distribution has been completely changed. The nearest example of this is that which was decided for many reasons by today's scientists that our (Egyptian) northern shores witness a slow process of structure as well as land's creeping towards the north. One of the main reasons responsible for this may be the mud tossed on by the Nile every year and the desert sands winds continually bring with them.

If we want to understand the secret behind floods, or the nature of elements leading to the tottering of land and the overflow and recess of water, we should trace first the source of the disorders which affect the crust of the earth from time to time together with the appearance and disappearance of mountains. The solid crust of the earth is, actually, a very delicate and sensitive balance; but it is one of the more complicated ones. Every spot on the earth is nothing but a scale precisely balanced with any other neighbouring spot. The accurate and correct balance, as it is known, is that whose two scales remain in equilibrium all the time. They remain so as long as weights put on each will be the same. If for one reason or the other weight on one of the two scale changes, this scale, as well as the other, will be affected. This disequilibrium continues until

weights readjusted and equilibrium restores to its normal position.

Actually, all parts of the earth's crust are completely balanced with other adjacent parts. While some of them carry high and heavy mountains, adjacent parts will have deep and low lands. Mountains, however, are there simply to keep the earth's balance; and that is exactly what the previous Qurânic verses have stated. But it is noted that neither the interior conditions of the earth nor the exterior ones to which mountains and hills are exposed can leave such a balance firm and unmoved. The molten interior of the earth is annihilated by currents which make the solid crust twisted, whatever such currents may be slow. The moment the crust twists and depressed spots formed accordingly, water comes to them. This water we call seas. By the passage of time, beds of such seas become the storing place for heavy and dense weights of sediments caused by denudation factors (1) coming from high areas in the crust, such as mountains and hills. There, fossils of sea creatures lie and the more such weights become heavy, the more sea beds go down. These sediments continue to accumulate until they themselves form the roots of independent mountains. This takes place due to the heavy pressure which falls on the two edges of the descending part of the crust falling in turn on it, which results in the twisting of the crust and its slow rising, in order to keep balance.

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(1) Of the important denudation factors are rains, floods, rivers, winds and the variation of heat in day and night times, and in summer and winter too. All these factors split and erase the crust of the earth.

This story explains in short the geological revolutions or the movement leading to the formation of mountains. When the first geological revolution took place due to the disturbances which annihilated the interior of the earth since the beginning, reaction to that revolution occurred on the crust of the earth by the appearance of continents and the rising of old mountains on it. Then, and with the work of denudation factors which hewed and splitted mountains and carried, later, their remnants to the deep beds of seas and oceans, disequilibrium took place. Here, the crust of the earth began to restore its disturbed equilibrium and the level of the ocean gradually elevated until water flooded and new seas appeared on the sides of continents leaving traces represented in sediments seen today, as it has been already said. Thus, mountains are to be scientifically considered as weights which have to keep the balance of the crust of the earth and, then, keep it firm without being crushed or destroyed through centuries, during which equilibrium remained steady despite the high pressures which fell down on the interior of the earth and the sweeping slow currents which carried weights. This wonderful meaning is exactly the same the previous verse already quoted has referred to.

"Allah is the light of the heavens and the earth. A likeness of His light is as a pillar on which is a lamp — the lamp is in a glass, the glass is as it were a brightly shinning star-lit from a blessed olive-tree, neither eastern nor western, the oil whereof gives light, though fire touch it not — light upon light. Allah guides to His light whom He pleases. And Allah sets forth parable for men, and Allah is Knower of all things." Sûrat Al-Nur (The Light).

This verse brings nearer to our minds, feelings and sentiments some of the qualities of God, the Supreme Deity, in the form of adages. From this account, it will not be difficult for us to realise that light may have another meaning other than that of the "light" or the energies produced by luminous bodies subjugated to the familiar light laws.

God who created the heavens and the earth to be subjects for reflection has prescribed for all such bodies wonderful systems which keep them in order. He also granted them the splendour which made out of them, in the space or in the infinite space, since Creation took place till now, marvellous signs. He created the bodies of the sky either in self-radiant forms, such as suns and stars, among which is our sun referred to by the Holy Qurân as the shinning lamp which sends besides light other thermo and non-thermo energies, or planets and moons which follow the former, reflecting the sun's light and sending it to the depths of the space.

The same verse goes on to describe God's light [1] as the space (or pillar of light or an aperture which is the energy) where the beauty and radiance of the Creator show themselves. This picture resembles the light emanated from a lamp, which is the burning wick kept inside a glass, and thrown inside an aperture, which fills both east and west, and everywhere, with radiance. This lamp, with its olive-oil, which was considered by the Arabs as the best of all oils, refers to the fact that all this splendour and radiance are nothing

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(1) In some of the books of Tafsir (Interpretation of the Qurân) they attribute this light to the Prophet (Peace be Upon Him), while others say otherwise.

but a single branch of a blessed tree with limitless good and benefits and whose other branches go to numberless worlds unknown to us. "Glory be to Him, and highly exalted is He above what they ascribe (to him)". "Nothing is like Him."

"Light" is also mentioned in other verses. They are :

"Allah is the Friend of those who believe — He brings them out of darkness into light." — Sûrat Al-Baqara (The Cow).

"And those who disbelieve, their friends are the devils who take them out of light into darkness." — Sûrat Al-Baqara (The Cow).

In Sûrat Al-Maida (The Food) the following appears :

"Indeed, there has come to you from Allah, a Light and a clear Book"

"And brings them out of darkness into light by His will."

"Surely We revealed the Torah, having guidance and light."

"And We gave him the Gospel containing guidance and light."

"Praise be to Allah, Who created the heavens and the earth, and made darkness and light." — Sûrat Al-Anaam (The Cattle).

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(1) This is the same meaning included in the following two verses taken from Sûrat Al-Raad and Fatir respectively. They are: "Say: Are the blind and the seeing alike? Or, are darkness and light equal ?" "And the blind and the seeing are not alike, Nor the darkness and the light."

The word "light" used in the last verse alone may mean the "light" which disperses the night's darkness as well as the darkness of the space containing stars and planets. But in the former, "light" was used to describe the element which overwhelms disbelief and atheism. It also refers to the miracles and splendour of the Creator. The same meaning is also included in the following verses :

"So those who believe in him and honour him and help him, and follow the light which has been sent down with him — these are the successful." — Sûrat Al-A'râf (The Elevated Places).

"They desire to put out the light of Allah with their mouths." — Sûrat Al-Tauba (Repentance).

"I, Allah, am the Seer. A Book which We have revealed to thee that thou mayest bring forth men, by their Lord's permission, from darkness into light." — Sûrat Ibrahim (Abraham).

"And to whom Allah gives not light, he has no light." — Sûrat **Al-Nur (The Light).**

"He it is Who sends blessings on you, and (so do) His angels, that He may bring you forth out of darkness into light." — Sûrat Al-Ahzab (The Allies).

"Is he whose breast Allah has opened to Islam so that he follows a light from his Lord ?" — Sûrat Al-Zumar (The Companies).

"And the earth beams with the light of its Lord, and the Book is laid down." — Sûrat Al-Zumar.

"He it is Who sends down clear messages to His servant, that he may bring you forth from darkness into light." — Sûrat Al-Hadid (Iron).

"They desire to put out the light of Allah with their mouths, but Allah will perfect His light." — Sûrat Al-Saff (The Ranks).

"So believe in Allah and His Messenger and the Light which We have revealed." — Sûrat Al-Taghabun (The Manifestation of Losses).

"So that he may bring forth those who believe and do good deeds from darkness into light." — Sûrat Al-Talaq (Divorce).

The word "light" may also denote God's Book which guides people to happiness, here and hereafter. This is shown in the following two verses :

"O people, manifest proof has indeed come to you from your Lord and We have sent down to you a clear light." — Sûrat Al-Nisâa (The Women).

"Is he who was dead, then We raised him to life and made for him a light by which he walks among the people." — Sûrat Al-Anaam (The Cattle).

It is obvious that the word "light" mentioned here means "existence", "evidence" and "faith". It may also mean all of them, so as to be so clear and easily seen.

"He it is Who made the sun a shinning brightness, and the moon a light." — Sûrat Yunus (Jonah).

Here, we have to pause a little in order to be able to realise the precision of the scientific expression and to see another side of the wonderful inimitable elocution of the Qurân. The Holy Book describes a very

important phenomenon. The sun sends to us rays which not only give light,(1) which means illumination, but gives, through a big part of sun's radiation amounting to one half of its energy beamed to us and to the space, heat which warms intervening materails and bodies. A small part of the sun's radiation, which could not be seen nor distinguished, goes out in the form of ultra-violet rays which have effect on living bodies. But the moon does not reflect back from sunrays except the pure light in addition to the radiance coming from it in weak infra-red rays void of any effect on the earth. The Qurân gave these meanings on a scientific level. It differentiates between the radiation coming from the sun and that coming from the moon. The former it describes as the light which subsists by itself, while the latter is that which subsists through some other thing. If that is the case, can we say that Muhammad was one of the scientists in order to be able to give such a scientific fact either in meaning or in words? Actually, such a question should be left to obstinate contenders to answer.

"See they not that We in controlling the earth gradually reduce its outlying borders?" — Sûrat Al-Raad (The Thunder).

This verse refers to the fact that since its creation, the earth was diminished along its axis. In this reference, there is an explanation of a universal phenomenon which scientists have not been aware of unless

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(1) "Light" meaning "existence" is the same given in this verse: "Allah is the light of the heavens and the earth". This, again, means that when God wanted to show Himself, He, as it has been told before, created the universe, filling it, with its space, with light. This picture resembles that of a lamp giving light to an aperture or pillars of light.

recently. Scientific researches made on the shape of the earth proved that its diametre, connecting both poles, diminishes slowly, but continuously. This was taking place since it was created ; and for this reason its shape changed from a sherical shape to an elliptic one.

In mentioning this fact which the human mind cannot understand except after acquiring the knowledge of the recent scientific developments and the most complicated subjects of mathematics, physics and astronomy, the Qurân did not mention it in a complicated form, but in very simple one, showing that it is nothing but an intuition which the human mind can easily absorb. This reference is also a proof of the heavenly law's insistence that the perfect and faithful man should be aware of everything in sciences in order to be deserving the ability and quality of reasoning and thinking God has granted him. In so doing, man will be able to change complicated and up-to-date scientific facts to intuitions which everybody should know. The appeal to the achievement of scientific progress could not be stronger than that included in such a Qurânic verse.

The same meaning was repeated in this verse quoted from Sûrat Al-Raad : "See they not that We are visiting the land, curtailing it of its sides."

"And go not about in the land exultingly, for thou canst not rend the earth, nor reach the mountains in height." — Sûrat Al-Isrâa (The Ascension).

Although this verse means by its superficial linguistic expression that it is impossible for anybody to

sunder the earth or go high to reach the top of mountains, yet it exposes to the bright and developed mind how the earth is hung in the universal space with nothing holding it except the omnipotence of God. If anybody will not be able to collect from this verse the meanings it really includes, such a man will never understand how he is challenged to go ahead and rend the earth.

Another thing the reader can collect from the same verse. Although the earth is a small planet and although it became possible for the man of our era to go round it in one day or a part of a day, the fact still remains that it is impossible for anybody to rend it. If this is the case why is it so difficult ? It is difficult because of the hard crust beneath which exist thermo-energies and the very high pressures found in the interior of the earth which make the question of rending it a matter of concrete impossibility.

"He created the heavens and the earth in true (proportions). He makes the night overlap the day..." — Sûrat Al-Zumar (The Companies).

In addition to the reference made in this verse to the fact that the earth is hung in the space, as it has already been explained, it contains, besides, two new facts. The first is that the shape of the earth is almost sherical such as that of a ball; and the second is that the earth revolves around its axis. This is in addition to the other fact that on the surface of the globe there are always a day and a night at the same time. The inimitable elocution of this verse is evident from the fact that it was revealed to the Prophet even before the Man of the old world could discover America and before

Man knew those remote places where such phenomenon could be easily seen and noticed. It is known that while night prevails America, the old continents live in daytime. It is known also that night comes from west to east, enveloping the earth and its atmosphere and covering what was lit by daylight. This is exactly what the verse shows which is a wonder in picturising the shape of the earth, its rotation and the relation between its revolution around itself and the appearance of day and night.

"And the earth moreover Hath He made almost spherical." — Sûrat Al-Nâzi'ât (Those Who Yearn).

This verse proves that Almighty God has created the earth in the form of an egg (not completely circular). This fact was endorsed by science which proved again that the earth is really of this shape. Actually, Man's idea about the shape of the earth has developed; after he had believed that it was a limitless flat space, he realised later that it is spherical. Man has come to know that when he thought of going round the earth and discovering its seas and oceans. After the advancement of civilisation and the increase of Man's knowledge of mathematics and astronomy, Man was able to measure and count the diametres of the earth, which led him to the conclusion that it is not completely circular, but elliptic. This, in turn, gave another proof that that Book was really revealed by a Knowing Creator, to Him "falsehood cannot come".

"*If you are able to pass through the regions of the heavens and the earth, then pass through. You cannot pass through but with authority.*" — Sûrat Al-Rahman (The Beneficent).

By the linguistic expression of this verse it becomes clear that it is not easy for anybody to pass through the heavens except after attaining sufficient power. The same meaning was given in previous verses. But after the advancement and development of sciences and after we have prepared ourselves to travel to planets, it is our duty now to try to go deep in the meaning the verse contains. Actually, the Qurân is the Book of all times and It is always up to date. There is no doubt that it was in the knowledge of God that one day Man will acquire a high level of learning and make progress in sciences. And in this age of space it becomes opportune to remind Man that this Book was revealed by God. God's words that man "cannot pass through but with authority" have also to be re-interpreted. Previously, they meant the impossibility of doing such a thing. But now, they have to be interpreted as directives and, then, incentives for attempt. This is in spite of the fact that the regions of the heavens and the earth should not be determined by reaching the Moon or Mars. These regions are more distant than this. Formerly, we had quoted similar verses and explained how travellers in the space would expose themselves to destruction in so doing.

# TIMING IN THE HOLY QURAN

Since ancient times, some nations, such as Egyptians, Romans, Persians and Europeans, adopted the solar year for timing, although they differed in fixing the date for the beginning of years and the number of days in each month, which constituted one part of 12 in each year. Before the advent of Islam, Egyptians made the numbers of days in each month 30, with the addition of 5 or 6 days to the year at the end of it. The lunar calendar known to us now, or the Hijrite Calendar, has not been adopted except after Islam. This is despite the fact that it was followed in pre-Islamic days by the Arabs and certain groups of Jews, as well as in India and China, but in another form.

Attempts were made to unite both solar and lunar calendars at the time when months were nearer to nature represented in the sun and the moon, taking into consideration that the lunar year included 12 lunar months. To achieve this goal, Indians took the moment the crescent appeared in the sky as the beginning of the new year. That was before the coming of the spring. By so doing, they had a year of 12 months, with 30 days in each. Later, the beginning of the year gradually lagged behind the spring, making a difference of one or more than one month. When such a thing occurred, they used to adopt a leap year, including 13 months. By this action, one certain month had to be repeated twice

Jews in Yathrib fixed the days of the lunar months as 30 or 29. They used to determine the beginning of the year by the appearance of the crescent they used to see about the beginning of autumn. By this way, they were in need of some of the leap years which included 13 months each.

This is how the nations of the earth differed at that time in adopting the days the years began with. This occurred despite the attempts they made to connect the beginnings of the years with the seasons of those years. But the grave and serious problems with the Arabs was that concerning the fixation of the pilgrimage day. They found that the tenth day of Zul Haj oftenly came in winter. Later, it was gradually delayed, until it came in autumn, then in summer, then in spring, and so on. This contradicted the arrangements they made for their travels, marketing, trades, and even wars, and other activities they used to make in pre-Islamic days. And for this reason, they adopted the idea of the additional days, which could be summarised as follows : Since the solar year represented by the four seasons exceeded in number the lunar year by about 11 days, one month could be added to the lunar year every two or three years in a bid to make it corresponding with the solar year. On that basis, they preferred to perform pilgrimage in Zul Haj in two successive years. The third year they made it 13 months; and by this, that year ended with Muharram during which they again proceeded for pilgrimage.

Even after making all these attempts, the Arabs noticed that the fractions of the familiar solar year

(resulting from the revolution of the earth) could be collected to form, in the course of time, a full complete month. For this reason, they supplemented to the year other additional days.

The Arabs' customs and traditions, since the days of Ibrahim, prevented wars in four months every year, in Zul Qaad, Zul Haj, Muharram and Rajab.

Referring to this, the Holy Qurân says in Sûrat Al-Tauba (Repentance) :

"Surely the number of months with Allah is twelve months by Allah's ordinance, since the day when He created the heavens and the earth — of these four are sacred. That is the right religion; so wrong not yourselves therein. And fight the polytheists all together as they fight you all together. And know that Allah is with those who keep their duty. Postponing (of the sacred month) is only an addition in disbelief, whereby those who disbelieve are led astray. They allow it one year and forbid it (another) year, that they may agree in the number (of months) which Allah has made sacred, and thus make lawful what Allah has forbidden. The evil of their doings is made fairseeming to them. And Allah guides not the disbelieving people."

Interpreters had different ideas about the question of additional days. Some of them preferred, as we have said, to increase the months of the lunar year so as to correspond with the solar year. Some others interpreted the question as a delay in the observance of one of the four sacred months in order to make fighting during it lawful and in order to release themselves from the tradition of staying for three months without breaking out wars.

Of the important astronomical or universal phenomena on which timings depend is the confirmation of the appearance of the crescent in order to determine the first days of the Hejrite months. After the crescent is witnessed, the moon goes eastwards away from the sun. This increases the length of time between the disappearance of the moon and sunset, until it becomes a full-moon. Here, it disappears around dawn. At that time, the moon goes to one direction, while the sun goes otherwise. In the second half of the Hejrite month, the moon disappears during daytime. This becomes delayed gradually until the moon completes a full round, putting itself between both the sun and the earth. At that time, one half of the moon facing the sun becomes luminous while the other, facing the earth, becomes dark. Later, the latter starts to get itself lit and appears in the form of a small crescent which grows gradually in the course of time.

The important point is that the moment the new crescent is born in is the same everywhere in the globe, regardless of day or night. Thus, the time at which the crescent is born should have astronomical value as it determins timings. In this meaning, the Holy Qurân says in Sûrat Al-Baqara (The Cow) : "They ask thee of the new moons. Say : They are times appointed for men, and (for) the pilgrimage."

It is probable that strong sunlight during the day or the accumulation of clouds in the sky or bad witness for any reasons may prevent the witness of the newly-born crescent. It is a fact that in certain countries sunset takes place before the appearance of the crescent, while in others chances allow the witness of the crescent

immediately after sunset. And for the absence of quick communications facilities at that time, the Holy Qurân asked people to keep fasting the moment they witnessed the crescent. In Al-Baqara, God says : "So whoever of you is present in the month, he shall fast therein."

This had been done as if Prophet Muhammad knew that the Hejrite month had started at a fixed time and that the moon was difficult to be seen sometimes and completely impossible to be witnessed sometimes else. Here, we may ask again : Was Muhammad so distinguished in astronomy or mathematics ?

On the other hand, we notice that stars or planets do not complete their revolution around the sun at equal intervals. The length of the year on the earth — as it was stated — differs completely than that on Mars, Mercury, Venus, Jupiter, etc. There may be other planets which follow other suns which complete their revolution around their suns in thousands of the years known in our planet. The idea of diversity among days and years in worlds existing beyond our own is mentioned in the Holy Qurân as this : "And surely a day with thy Lord is as a thousand years of what you reckon." Sûrat Al-Hajj (The Pilgrimage). And in : "To Him ascend the angels and the Spirit in a day the measure of which is fifty years." Sûrat Al-Ma'ârij (The Ways of Ascent).

# CONCLUSION

"Is it not enough that thy Lord is a Witness ever all things ?"

With this verse with which I conclude my book, I, once again, want to remind, after all that I have said and explained, that, since the inimitable elocution of the Qurân was so evident and apparent in all the verses quoted therein, we should have faith in God and, with it, we should emancipate ourselves from the world of material. Then, we will realise that it is the Almighty God who gives us proofs of the existence of whatever is around us and that those things found around are not the things which give such a proof. God, the Beneficent, is He Who gives this universe the form and the meaning, and this meaning is always kept in the depths of our souls and inner consciousnesses. This point was deliberately left in the course of our scientific survey, as science interpretes the universe's phenomena only. And for this reason physicals turn to philosophers and, later, to religious men. This is because religion is above philosophy and philosophy is again above science.

# CONTENTS

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